CLAIMS

We claim:

1. A method of manufacturing a reference substrate on a projection imaging tool, the method comprising:

providing at least one reticle, the at least one reticle including interlocking rows and columns of alignment attributes;

exposing the at least one reticle onto a substrate that includes a recording media, in a pattern such that adjacent exposures create a pattern of interlocking alignment attributes;

developing the recording media;

etching the exposed substrate;

stripping the substrate of the recording media;

providing an intra-field error of the projection imaging tool;

measuring overlay errors of desired alignment attributes and calculating the positional coordinates of the desired alignment attributes with respect to the intra-field error and overlay errors, and creating a calibration file associated with the reference substrate that records the positional coordinates of the alignment attributes.

2. A method as defined in claim 1, wherein measuring the overlay errors further comprises using an overlay metrology tool.

3. A method as defined in claim 1, wherein the substrate is a semiconductor silicon wafer.

4. A method as defined in claim 1, wherein the substrate is a semiconductor quarts wafer.

5. A method as defined in claim 1, wherein the substrate is a flat panel display.

6. A method as defined in claim 1, wherein the substrate is a reticle.

7. A method as defined in claim 1, wherein the substrate is a photo-mask.

8. A method as defined in claim 1, wherein the substrate is a mask plate.

9. A method as defined in claim 1, wherein measuring the overlay errors includes using an optical overlay metrology tool.

10. A method as defined in claim 1, wherein the recording media is a positive resist material.

11. A method as defined in claim 1, wherein the recording media is a negative resist material.

12. A method as defined in claim 1, wherein the recording media is an electronic CCD.

13. A method as defined in claim 1, wherein the recording media is a diode array.

14. A method as defined in claim 1, wherein the recording media is a liquid crystal.

15. A method as defined in claim 1, wherein the recording media is an optically sensitive material.

16. A method as defined in claim 1, wherein the at least one reticle is chrome patterned glass.

17. A method as defined in claim 16, further including a reflective dielectric coating.

18. A method as defined in claim 1, wherein the at least one reticle is an attenuated phase shift mask.

19. A method as defined in claim 1, wherein the at least one reticle is reflective.

20. A method as defined in claim 1, wherein the alignment attributes include a box-in-box pattern.

21. A method as defined in claim 1, wherein the alignment attributes include a frame-in-frame pattern.

22. A method as defined in claim 1, wherein the alignment attributes include a vernier pattern.

23. A method as defined in claim 1, wherein the alignment attributes include a segmented bar-in-bar pattern.

24. A method as defined in claim 1, wherein the alignment attributes include a grating.

25. A method as defined in claim 1, wherein the at least one reticle is a single reticle.

26. A method as defined in claim 1, wherein the at least one reticle includes multiple reticles wherein a first reticle includes a first type of alignment attributes and a second reticle includes a second type of alignment attributes.

27. A method as defined in claim 26, wherein a plurality of the second type of reticles are used.

28. An apparatus for use in alignment of projection imaging tools, the apparatus comprising:

a substrate that has alignment attributes that occur in interlocking rows and columns across the substrate; and

a calibration file associated with the substrate that indicates the position of the alignment attributes on the substrate.

29. An apparatus as defined in claim 28, wherein the calibration file is recorded onto a computer readable medium.

30. A method of using a reference wafer comprising:

loading the reference wafer, that includes overlay targets, onto an imaging machine;

loading and aligning an overlay reticle onto the imaging machine;

exposing the reference wafer with the overlay reticle;

developing the reference wafer;

measuring the overlay targets;

subtracting offset values, associated with the wafer, from the measurements; and

calculating errors of the machine.

31. A method as defined in claim 30, wherein the machine is a stepper projection imaging system.

32. A method as defined in claim 30, wherein the machine is a scanning projection imaging system.

33. A method as defined in claim 30, wherein the machine is an electron beam imaging system.

34. A method as defined in claim 30, wherein the machine is an electron beam direct write system.

35. A method as defined in claim 30, wherein the machine is a SCAPEL tool.

36. A method as defined in claim 30, wherein the machine is an extreme ultra-violet imaging tool.

37. A method as defined in claim 30, wherein the machine is an ion projection imaging tool.

38. A method as defined in claim 30, wherein the machine is an x-ray imaging system.

49. A method as defined in claim 30, wherein the subtracting and calculating after performed on a computer.

50. A method as defined in claim 30, wherein the offset values associated with the reference wafer are stored in a calibration file.

51. A method as defined in claim 50, wherein the calibration file is stored on a computer readable medium.